NOTES ON DIABETES.

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1. On Casts in the Urine During Diabetic Coma.

A small amount of albumin and a few casts are not uncommon in the urine of many, according to some of most, cases of diabetes mellitus. Cardiovascular changes or uræmic symptoms may give evidence of a true chronic diffuse or interstitial nephritis, and explain the persistence of albumin and casts. During or just preceding diabetic coma, however, casts may suddenly appear in such extraordinary numbers as to deserve mention. E. Külz[1] and Aldehoff[2] were the first to notice this phenomenon. Sandmeyer made a report on it in 1891 to the Tenth Congress of Internal Medicine. Mering,[3] Rumpf,[4] Nebelthau[5] and Williamson confirmed it. It had been previously noticed that in some cases of diabetic coma casts were present, but it was apparently regarded as accidental. Since my attention was called to this phenomenon by reading Williamson's[6] work I have seen it in all of three cases where I have sought for it. If the urine obtained as coma approaches be allowed to stand for a few hours, a light, hazy, grayish or slightly yellowish sediment will be seen at the bottom of the sediment glass, rising, perhaps, to one-sixth the height of the urine. The same sediment is, of course, obtainable by means of the centrifuge. This sediment will be found to consist almost entirely of short, broad, light-colored, finely granular casts. There is no relation between the amount of albumin and the number of these casts. In several cases Williamson watched the urine carefully for days before the onset of the coma, but no deposit was seen until just before the symptoms of coma commenced. The casts may appear twenty-four hours in advance of coma, and thus give warning of its approach. In cases of coma with recovery casts have been known to make their appearance with the manifestations of coma, and have disappeared as the symptoms have vanished. Aldehoff[7] has seen them appear within three hours in the urine of a diabetic who returned from a fatiguing walk, with a rapid pulse, oppression in the chest, labored, deep breathing—in short, what seemed to Aldehoff as threatening coma. The urine contained numerous "coma-casts." The urine, passed three hours before, had been free from such casts. The patient recovered and the casts disappeared.

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[1] C. Külz. Inaug. Dis. Marburg, 1895, reports ten cases of E. Külz's in which this phenomenon was observed.

[2] Aldehoff, in Külz's Klinische Erfahrungen über Diabetes Mellitus, Jena, 1899, p. 458.

[3] Ibid.

[4] Rumpf. Ueber Diabetes Mellitus. Berl. klin. Woch., 1895, No. 31.

[5] Nebelthau. Berliner klinische Wochenschrift, 1896, No. 34.

[6] Williamson. Diabetes Mellitus and its Treatment. Edinburgh, 1898, pp. 178 and 286.

[7] Aldehoff. Loc. cit.

The cases I have examined were as follows:

CASE I.—A man, aged sixty-five years, seen with Dr. Wynekoop. He had not consulted a physician for years until a few days before, when he had gone to Dr. Wynekoop, who found sugar, the first knowledge of the existence of diabetes. Questioning, however, revealed the fact that the subjective symptoms of diabetes dated back for more than a year. When I saw him coma was advancing. Urine was obtained by the catheter, and showed in addition to the ordinary findings of the urine of diabetic coma the sediment of finely granular casts above described. In this case, a large drop of urine being examined with a low power and no cover-glass being used, they were seen piled against and across one another like sticks in a loose wood-pile. There was but a trace of albumin. Death occurred in less than twenty-four hours after the specimen was obtained.

CASE II.—An old lady, aged eighty-four years, whose husband had died of diabetes seven years before, consulted me because of sleeplessness and mental depression. There were thirst, weakness, and furuncles. Sugar was abundant in the urine. Three weeks later a fatal coma developed. Enormous numbers of granular and hyaline casts were present as in the previous case; albumin was but slight in amount.

CASE III.—In a case seen with Dr. Pigall, a woman, aged about sixty years, who had been told three years before that she had sugar in the urine, became dull, dyspnœic, had several convulsions, followed by coma and death. There was no paralysis. The urine was loaded with sugar and albumin and contained very large numbers of casts. This may be an instance of uræmic coma or a mixture of the uræmic and diabetic.

This phenomenon may, as Aldehoff and Williamson claim, be of value in the early diagnosis of coma. With suspicious symptoms it might well be a confirmatory test, and it might enable the physician by early treatment to secure at least a temporary recovery. Naunyn, while admitting the presence of casts during coma, is rather skeptical regarding their occurrence in the enormous numbers Külz described, and especially as to their frequent appearance in the prodromal stage.[1] Even though later investigation may show that in other forms of coma there may be similar casts the value in the early recognition of diabetic coma is not lessened. Upon just what pathological condition it depends is unknown. It is possible or even probable that the kidneys during coma are overpowered by the attempt to eliminate some toxic substance, be it acetone, diacetic acid, or oxybutyric acid, and that there are rapid changes in the kidneys such as have been noted by many observers, especially the fatty degeneration and the alterations in the loop of Henle, and that because of these renal changes cylindruria results. As

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[1] Naunyn. Diabetes Mellitus, p. 293. Nothnagel's System.

Rumpf expresses it, there is a destruction of the secreting epithelium that in the elimination of the toxic products of tissue-change suddenly gives way.

2. On the Occasional Low Specific Gravity of Saccharine Diabetic Urine.

The specific gravity of the urine in diabetes generally rises with the amount of urine and the percentage of sugar. So true is this that, given the specific gravity and the amount of urine, approximate quantitative estimation of the sugar can be made by empirically constructed tables. Yet the specific gravity of the sugar-containing urine may be so influenced that it is lowered below the average of saccharine urine or even that of normal urine. A close study of cases of diabetes shows that at times diabetics may pass urine that contains sugar and that has a specific gravity as low as 1020 or much less. This does not include the polyuria with low specific gravity that sometimes precedes diabetic glycosuria or persists during convalescence and after sugar has disappeared. Polyuria may occur because of the development of a chronic interstitial nephritis, in which case the urine will show albumin and casts, but at the same time contain sugar and be of lower specific gravity. In fact, some go so far as to say that when in diabetes mellitus the specific gravity falls below 1020 one should always suspect the beginning of an interstitial nephritis. In these cases the sugar later may be reduced to a minimum or entirely disappear.

On April 26, 1900, I examined a man, aged fifty-four years, with a typical history of thirst, excessive appetite, emaciation, weakness, polyuria, and glycosuria. He was then on diabetic treatment by his physician. His total urine for twenty-four hours was 1500 c.c., specific gravity 1012. It contained a trace of sugar, albumin, and a few granular casts. There was beginning consolidation of the right apex. Here the nephritis apparently lowered the specific gravity.

Strümpell says that in those who are very weak the specific gravity may fall below 1020.

The drinking of large amounts of water or other fluid may lower the specific gravity in a marked manner. A patient of mine, aged fifty-eight years, with well-marked diabetes, drank large quantities daily of a mineral water of supposed curative properties. The specific gravity of the urine for days was never over 1019 and was often 1015 to 1018, yet the test for sugar was always strongly positive. Another patient, a fleshy man, aged fifty-five years, under observation for nearly a year, with typical manifestations of diabetes of the obese adult type, came into my office one day partially intoxicated and soon asked for a urinal. He passed about twenty-four ounces of urine, which I immediately tested for sugar. There was a prompt reaction. The specific gravity of the specimen tested by different urinometers, and by another physician as well as myself, was 1004. The patient had been drinking beer with some friends all the morning, an explanation of the intoxication, the polyuria, and the low specific gravity.

On looking up the subject I find that even lower specific gravities than this are reported as occasionally met with. Of 224 cases in one of Külz's series, twenty-seven, or 12 per cent., showed at times a specific gravity of less than 1010. In one case it was as low as 1003. Eichhorst says that once in a while a specific gravity as low as 1008 or 1002 is seen. The latter case is perhaps the one Waterman reported in the *New York Medical Record* in 1882. Naunyn found a specific gravity of 1003 in spite of over 1 per cent. of sugar. And many other cases with occasional specific gravities below 1010 are reported. The lesson is, therefore, plain that the only safe way is to examine every urine for sugar, even when the specific gravity is low. One patient may be in the incipient stage of a complicating chronic nephritis, may be weak and debilitated, or may have been consuming large amounts of liquids, any one of which circumstances may tend to lower the specific gravity of the sugar-containing urine. And the importance of this fact to the life insurance examiner needs no elucidation. That some companies to-day only require the examiner to test for sugar when the specific gravity is above 1020 or perhaps 1015 shows that the occasional occurrence of saccharine urine of low specific gravity is not as generally recognized as it should be.

PNEUMONIC COMPLICATIONS IN PULMONARY PHTHISIS.[1]

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Ever since the lungs of phthisical patients have been examined by pathologists the variety of lesions observed has made a great impression on all careful investigators. The variety is such that almost by itself the question arises whether all these different lesions could really be produced by one and the same disease, or whether several diseases working together were at the bottom of them.

This question found different answers by different observers, and a very heated scientific discussion arose over the question of the " unity " or " dualism " in the phthisical process. The most important exponent of the doctrine of the unity of tuberculosis was the great French clinician and anatomist, Laennec, whereas Virchow differentiated strictly between the tuberculum proper and the more diffuse caseous pneumonia.

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[1] Paper read at the thirtieth annual meeting of the Medical Society of the State of California, at San Francisco, April 17, 1900.